

CLAIMS

1. Process for producing a krypton/xenon mixture from air, characterized in that:

5 (a) air is distilled in at least one air distillation apparatus (8) so as to produce a stream of liquid oxygen containing most of the krypton and xenon from the air, and this stream of liquid oxygen is vaporized;

10 (b) a partial oxidation of at least one hydrocarbon is carried out with at least one portion of the gaseous oxygen obtained in step (a), so as to produce a syngas containing at most 0.1 ppm mol of oxygen; and

(c) constituents other than krypton and xenon are removed from the syngas.

15 2. Process according to Claim 1, characterized in that the partial oxidation is carried out by reacting the oxygen with an excess of hydrocarbon(s) and optionally with steam.

20 3. Process according to Claim 1 or 2, characterized in that the partial oxidation is carried out by reacting the oxygen with natural gas, methane, naphtha or coal.

25 4. Process according to any one of Claims 1 to 3, characterized in that step (c) includes a dessication/decarbonation step followed by a cryogenic separation.

5. Process according to Claim 4, characterized in that the cryogenic separation comprises a series of steps that produce a krypton/xenon-enriched stream furthermore containing essentially methane and carbon monoxide, a 30 hydrogen stream, a carbon monoxide stream and a waste stream.

6. Process according to Claim 5, characterized in that the said series of steps comprises a step of sending liquid carbon monoxide into the top of a first column (21),

an expansion (at 35) of the bottom liquid from this column, the removal of the hydrogen from a second column (23) that is fed at the top with the said expanded bottom liquid, an expansion (at 36) of the bottom liquid from the second  
5 column (23) and the injection of this expanded liquid into a low-pressure column (25) fed at the top with liquid carbon monoxide and producing, as tops, carbon monoxide and, as bottoms, the said krypton/xenon-enriched stream.

7. Process according to Claim 5 or 6, characterized  
10 in that the cryogenic separation furthermore includes, optionally after intermediate warming of the krypton/xenon-enriched stream, a cryogenic separation, on the one hand, of the krypton and xenon from, on the other hand, the other constituents of this stream.

15 8. Plant for producing a krypton/xenon mixture from air, characterized in that it comprises:

- an air distillation apparatus (8) that produces a liquid oxygen stream containing most of the krypton and xenon from the air, this apparatus being combined with a  
20 reboiler for vaporizing this liquid oxygen stream;

- a partial oxidation reactor (2) fed, on the one hand, with the vaporized oxygen stream and, on the other hand, with a gas that contains at least one hydrocarbon, this reactor producing a syngas containing at most 0.1 ppm  
25 mol of oxygen; and

- means (3 to 7) for removing constituents other than krypton and xenon from the syngas.

9. Plant according to Claim 8, characterized in that the said removal means (3 to 7) comprise  
30 dessication/decarbonation means (4, 5) followed by a cryogenic separation unit (6, 7).

10. Plant according to Claim 9, characterized in that the cryogenic separation unit (6, 7) comprises a combination of columns (21, 23, 25, 27) suitable for

producing a krypton/xenon-enriched stream furthermore containing essentially methane and carbon monoxide, a hydrogen stream, a carbon monoxide stream and a waste stream.

5           11. Plant according to Claim 9 or 10, characterized  
in that the cryogenic separation unit (6, 7) comprises a  
first column (21), means for sending liquid carbon monoxide  
into the top of the first column, means (35) for expanding  
the bottom liquid from this first column, a second column  
10 (23) for removing hydrogen, the said second column being fed  
at the top with the said expanded bottom liquid, means (36)  
for expanding the bottom liquid from the said second column,  
and a low-pressure column (25) fed at an intermediate level  
with the expanded bottom liquid from the second column (23)  
15 and at the top with liquid carbon monoxide, this low-  
pressure column (25) producing, as tops, carbon monoxide  
and, as bottoms, the said krypton/xenon-enriched stream.

          12. Plant according to Claim 10 or 11, characterized  
in that the cryogenic separation unit (6, 7) furthermore  
20 includes a column for separating, on the one hand, the  
krypton and the xenon from, on the other hand, the other  
constituents of this stream.